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QUALITIES, RELATIONS, AND THINGS

PROFESSOR LOVEJOY'S resumption[1] of the discussion on secondary qualities raises at the outset in my mind that most depressing question, "Is agreement in philosophy possible?"

At the meeting of the American Philosophical Association in 1912, when this question was raised, it resolved itself into the question, "Are philosophical problems, provisionally, at least, isolable?" And Professor Lovejoy rightly, it seemed to me, contended that if the determination of any question involved as its premises the solution of all other questions, philosophic effort was hopeless. Inspired by my agreement with Professor Lovejoy and a disbelief in the extreme organic view which would make a complete botany of "the flower in the crannied wall" depend upon diverse issues of theology and anthropology, I ventured a practical application of our common belief by isolating one of Professor Lovejoy's arguments against neo-realism with the hope that he and I might thus arrive at a mutual agreement. But in two attempts I have found it utterly impossible to induce Professor Lovejoy to pay any attention to my argument on its own merits. He persists in looking beyond it to other differences between us, and thus escapes my well-deserved efforts to show the world that philosophers can sometimes settle a point of difference between them. Thus, in my last brief note, I happened to have been provoked into making the logically unnecessary announcement that I pay no homage to the usual or "familiar" distinction between qualities and relations. This, as any one who re-reads my note can see, was an *obiter dictum* and not put forth as an essential part of my argument. Nevertheless, Professor Lovejoy's last communication fixes on this side issue and ignores the two main points of my contention. Under the circumstances, the promptings of my heart are to give up the effort, to "curse God and die." But the hope that

[1] This JOURNAL, Vol. XI., page 421; *cf.* Vol. IX., page 675, Vol. X., pages 27, 214, 510.

by persistence I may, perhaps, induce abler hands to take up and champion my righteous cause induces me to make a third attempt.

I

The original issue consists of two parts.

(1) Is it a fact that science regards secondary qualities as subjective? Is it true, that in any physical investigation, *e. g.*, on light, the category of consciousness or subjectivity or mere appearance is actually used to explain redness, blueness, etc.? Professor Lovejoy's colleague at Johns Hopkins,Professor Wood, has recently raised in a very original form the question, Why does a prism produce the dispersion of light called the spectrum? Will any physicist venture to bring in the category of consciousness to explain this, or contend that the difference between colors belongs, after all, to the realm of mere appearance? Professor Lovejoy harps on the fact that no physicist regards an ether vibration of 6,438 A° and red as identical. But why assume that the difference between red and a wave-length of 6,438 A° (if indeed there be any difference) must be no other than that between appearance and reality or subjectivity and objectivity? Surely, such assumption is not necessary for any laboratory procedure or mathematical computation. As a matter of fact, the distinction between primary and secondary qualities, while probably inspired in its earlier forms (*e. g.*, in Kepler and Galileo) by neo-Platonic considerations regarding appearance and reality, has maintained itself in modern physics for a purely technical reason, viz., the need of a distinction between qualities which must be assumed as original and qualities like compressibility and malleability which are to be explained in terms of the primary ones; and as the list of primary qualities has changed, the line of division has been a shifting one and entirely irrespective of the concept of subjectivity. It is certainly possible to remain a good physicist and yet maintain that a wave-length of 6,438 A° impinging upon a proper surface is all that the physicist does or should mean by "red." One can deny the metaphysical doctrine that secondary qualities exist only in a realm of "merely subjective appearance," without in any way being compelled to give up any of the established methods of science. Such a denial certainly fits in with the physicist's assumption that the laws of coloration as treated in optics express what goes on in the absence of conscious observers and were true before the possible existence of conscious beings.

This question of the actual procedure of science does not, of course, settle the further philosophic question whether an ultimate interpretation of the procedure and result of physical science requires the notion of consciousness. But if Professor Lovejoy be correct, if

in their actual procedure scientists do and must introduce the category of subjectivity in their dealing with secondary qualities, there would be to most of us an almost conclusive authority against further dallying with such questions as are raised in Professor James's article—"Does Consciousness Exist?" or Professor Woodbridge's article—"The Belief in Sensations." Surely attempts to deny that which actually underlies the procedure of the sciences ought not, in this busy day, to be listened to by any self-respecting thinker. If, however, physical science can get along without the category of subjectivity, the issues which pan-objectivistic philosophies raise are at least worthy of a hearing. As yet, Professor Lovejoy has not produced the slightest evidence to prove that scientific procedure is incompatible with the neo-realistic view of secondary qualities as relations or processes between physical or physiological objects.

It will be observed that I do not contend that Professor Lovejoy's view, *e. g.*, of redness as just mere subjective appearance and nothing else, is incompatible with physics. Science is tough and can endure a great many interpretations. But I emphatically deny, and challenge Professor Lovejoy to *prove*, that there are any facts of physical science incompatible with the view that secondary qualities are a genuine part of the physical universe.

(2) My second and main point has been misapprehended by Professor Lovejoy probably because he regards it exclusively as an argument *for* neo-realism (the six previous arguments for which he believes he has refuted). But it is not primarily an attempt to prove anything, but rather a challenge to Professor Lovejoy to prove an assertion which he often makes. I deny his assumption that there is any contradiction involved in saying that the same object can "really" or objectively be red in relation to one screen and blue in relation to another, hot to one thermometer and cold to another, square from one point of view and oblong from another, etc.

Now as all students of logic know, it is obviously impossible to prove that any assertion does *not* involve self-contradiction, *i. e.*, does not imply two contradictory propositions. One can only indicate that there is no *prima facie* case for supposing any contradiction in the case by showing parallel statements which no one considers self-contradictory. Thus I urged that the same line can subtend an angle of 45° from one point of view and of 23° from another. Professor Lovejoy retorts that "this ignores the familiar distinction between qualities and relation," thus implying that angles are only relations. To this I replied in my second note that the distinction between qualities and relations is apparently not a very clear or sharp one to Professor Lovejoy himself, since he maintains that the same figure can not without contradiction be both square and oblong

(the difference in both cases being an angular one); and I urged the case of the parallelopiped, that is a rectangular one in one position and an oblique one in another.

Are "rectangular" and "oblique" qualities or relations? Professor Lovejoy does not meet my challenge, but simply points out what he considers fatal difficulties in a view which denies a fixed difference between qualities and relations.

To simplify the issue, however, I can withdraw the last point and ask directly, has Professor Lovejoy proved or made out a case for the contention that there is a *contradiction* in the assertion that the same object can be really red and blue?

It is to be observed that the expression "contradictory qualities" is based on some confusion. Qualities as such can never be contradictory. Indeed, it would be peculiar if the principle of contradiction, obviously a formal one, could tell us that certain empirical qualities like red and blue are contradictory, but that others like red and soft are not so. Red and blue are certainly no more contradictory than kindness and cruelty, yet the same man may in one transaction display kindness to A and cruelty to B. Indeed, he may display both kindness and cruelty in his relation to B alone, provided a distinction in point of view is made, *e. g.*, kindness from the point of view of B's ultimate interests, cruelty from the point of view of B's immediate interests. The principle of contradiction applies only to two propositions having the same subject and predicate, but differing in the quality of the assertion, or, more elliptically, that when anything is asserted it must not be denied *in the same relation.* Obviously, the principle of contradiction can have no application to a single assertion which predicates different qualities of the same object in different relations.

Please observe that I have not hitherto directly challenged Professor Lovejoy's right to start with the assumption (which he really makes) that secondary qualities can exist only in consciousness, and to argue that *therefore* the supposition that they are relations between physical entities is false (because it contradicts his assumption). What I have challenged is his contention that his assumption is necessitated by any logical contradiction in the view that secondary qualities are relations between objective entities. I have never entertained or expressed the hope that Professor Lovejoy and I might agree with reference to the truth of his fundamental assumption. That is a wider issue than the one which I have hitherto tried to raise. But I see no reason why Professor Lovejoy should not honorably agree with me that his original argument against neo-realism, based on the supposed contradiction in the objective nature of

secondary qualities, is, in the light of a clear analysis of the principle of contradiction, essentially unproveable.

II

With the above I ought to rest my case; for the further issue which Professor Lovejoy discusses so elaborately in his last article, viz., the distinction between qualities and relations, is unnecessary for the settlement of the question of the supposed contradiction in the objectivity of secondary qualities. Moreover, my own thoughts on the question of qualities and relations are an integral part of a metaphysical system or, if you please, phantasy, which is still in the process of incubation. However, as the mere glimpse of my nursling which my last brief note uncovered has affrighted such stout thinkers as Professors Lovejoy and Montague, so that they are willing to sink their serious differences in order to unite in exterminating it as a poisonous serpent, it is my duty to say something in support of this innocent fledgling and show that it is no monster, but the legitimate offspring of reflection. In thus displaying it prematurely before the public I can only hope that the philosophic world contains, besides rigorous logicians, who, like Professor Lovejoy, are admirably qualified to dissect it and pronounce it dead, some more sympathetic souls who may, perhaps, help me to nourish it into full life and usefulness.

III

Like the distinction between primary and secondary qualities, the distinction between qualities and relations seems to me a shifting one because the "nature" of a thing changes as the thing shifts from one context to another. Let us, then, like true philosophers begin with the "nature of things." To Professors Montague and Lovejoy the "thing" is like an old-fashioned landowner and the qualities are its immemorial private possessions. A thing may enter into commercial relations with others, but these relations are extrinsic. It never parts with its patrimony. To me, the "nature" of a thing seems not to be so private or fixed. It may consist entirely of bonds, stocks, franchises, and other ways in which public credit or the right to certain transactions is represented. And after all, what are private possessions but publicly protected rights to collect rent, exclude trespassers, etc.? At any rate, relations or transactions may be regarded as wider or more primary than qualities or possessions. The latter may be defined as internal relations, *i. e.*, relations *within* the system that constitutes the "thing." The nature of a thing contains an essence, *i. e.*, a group of characteristics which, in any given system or context, remain invariant, so that if these are changed the thing

drops out of our system. Thus, if a banker no longer issues credit or receives deposits he ceases to be a banker. But the same thing may present different essences in different contexts. As a thing shifts from one context to another, it acquires new relations and drops old ones, and in all transformations there is a change or readjustment of the line between the internal relations which constitute the essence and the external relations which are outside the inner circle.

Our neighbor M is tall, modest, cheerful, and, we understand, a banker. His tallness, modesty, cheerfulness, and the fact that he is a banker we usually regard as his qualities; the fact that he is our neighbor is a relation which he seems to bear to us. He may move his residence, cease to be our neighbor, and yet remain the same person with the same qualities. If, however, I become his tailor, his tallness becomes translated into certain relations of measurement; if I become his social companion, his modesty means that he will stand in certain social relations to me, etc. This view, of course, does not deny the existence of terms, literally termini of relations, but it denies that terms have any nature apart from relations. The world of existence is thus a network of relations whose intersections are called terms. These termini may be complex or simple, but the simplicity is always relative to the system in which they enter. Thus an atom or electron may be simple for many purposes of chemistry or physics, but from another point of view may be complex, possessing dimensions and other properties. Even the mathematical point is not absolutely simple. It is so only in point geometry. In line geometry a point is a complex formed by the intersection of two lines, and there is no reason for supposing that point geometry is more fundamental than line geometry. The prevailing metaphysic, founded on the model of the more widely taught point geometry, regards things as more fundamental than their relations, but it finds it difficult to tell us what the things are apart from their relations. The metaphysic here suggested starting with the relational structure of things avoids the ontologic ills that beset things in themselves.

The above view does not involve adherence to the doctrine commonly known as the relativity of knowledge. The transformations which are the objects of the natural sciences reveal on reflection certain invariant relations. These invariant relations (the objects of pure mathematics and logic) may be called rules in the process of the transformation of things. I see no reason, however, for modern subjectivism which places these rules in a mind outside of the nature of the things involved, but prefer, with Plato, to regard these invariant relations or rules as the very heart of the nature of things.

This, then, is a brief sketch of my metaphysical babe. Its features

are not yet definitely formed and its bones are not yet perfectly joined. There are, doubtless, many serious difficulties before it, and it may not survive its second summer. But I am not asking any one to adopt it. I reluctantly display so much of it before the public as is necessary to show that the fierce onslaught of Professor Lovejoy has not in the least hurt it.

IV

Professor Lovejoy's attack is all directed against that part of the above view which maintains that all qualities are essentially relational, *i. e.*, characteristics or processes which a thing can exercise only in relation to other things or within a system.

That we may not miss the force of any of Professor Lovejoy's objections let us follow his own order of exposition. He distinguishes between two possible meanings of the above doctrine—(1) the more radical view that qualities are reducible to relations, and (2) that qualities in some manner depend on relations. Three objections, which he considers fatal, are brought against the first. Let us examine these objections.

(*a*) A careful analysis of what Professor Lovejoy says under this head reveals only matters which are either irrelevant to the point at issue or else beg the question. He begins by denying that science has proved that "qualitative differences are quantitative differences in a homogeneous medium" (p. 425). But the reduction of qualities to relations is not the same as their reduction to quantitative differences. Indeed, I am inclined to go further than Professor Lovejoy and hold with Duhem that the progress of modern physics has been in the direction of a Neo-Aristotelian physics of qualities instead of a purely quantitative physics which we got through the Cartesian tradition; but physical qualities are surely not the private possession of things in themselves, but determinate relations which terms have in a physical system.

Another statement under this head which might have been intended as the point of the argument is the following: "What blue is, as a datum of sense-experience, we know very well. And we know equally well that it is not an undulation of a colorless medium." This strong statement is, I suppose, a denial that blue can be a physical quality at all and that, as a datum of sense experience, it is purely subjective. But as this is precisely what I question, it can not be used as a fatal objection against me without involving a *petitio principi*.

(*b*) Under this head Professor Lovejoy again confuses the reduction of qualities to relations with their reduction to quantitative differences. He then goes on to state the more serious objection that

the reduction of qualities to relations would leave us with a world of relations with no terms to be related. This seems to me a *non sequitur*. The denial of a distinction between qualities and relations does not mean a denial of terms or terminii of relation. It only means, as I have pointed out above, a denial that things have a nature apart from all possible relations; and I can not see how science would be in any way impoverished if these unrelated things in themselves were dumped into the cave which swallowed Korah.

(*c*) What Professor Lovejoy says under this head about Plato, the Megarians, and the fallacy of accident seems to me irrelevant to the principle that all qualities can be reduced to relations. Professor Lovejoy concludes that the assumption of the "absolute univocality of each determinate relation of each thing to any other specified thing is a *sine qua non* of all reasoning and all coherent thought" (p. 427). But this surely can not be a fatal objection against my view, for this is precisely what I have been urging all along as the true meaning of the principle of contradiction, viz., no entity can at the same time be and not be in a given relation to a given entity. But this "axiom of univocality" surely does not militate against the view that the same entity can at the same time have two different relations to two different entities. Thus, I conclude that Professor Lovejoy has not made out a single valid objection against the principle that qualities can be reduced to relations. At best, he has shown that it leads to consequences which he does not believe; he has not shown any consequences inconsistent with what I assume to be true.

I might stop here, but as I have not sufficient evidence for the above principle, but rely simply on the fact that it has not as yet broken down in my own thought or through the objections of such a powerful thinker as Professor Lovejoy, I must confess that it is possible that some one else, or Professor Lovejoy in another attempt, may show that the above principle must be limited, qualified, or modified. Hence, while I still believe the above principle in its more radical form, I am not ready to leave undefended the second interpretation; viz., that qualities depend upon relations. (It will be observed that if the more radical doctrine is true, the second is likewise so, but the giving up of the first does not necessitate the giving up of the second.)

With his usual subtlety Professor Lovejoy distinguishes two meanings in the principle that all qualities depend on relations.

(*a*) It might mean that the qualities of an object vary with, and are determined by, its relations. This, he thinks, does not remove the contradiction in saying that the same plane is objectively both red and blue. But that there *is* any contradiction in saying that the

same surface is red with reference to one camera plate and blue with reference to another plate is precisely what I deny. Professor Lovejoy concludes, "though a thing's relations to other things determine the character which at any given moment it has, they none the less unequivocally determine it to have, then and there, one character, and not two contradictory ones" (p. 427). This argument involves a serious equivocation in the use of the term *one character*. If by *one character* is meant the total nature which a thing in a given context has, the argument is obviously true, but irrelevant. If it means that the relations of a thing to other things always determine it to have but one characteristic and not many different ones, the argument is a clear case of the fallacy of exclusive particularity.

(*b*) The final argument is directed against the view that the same object may have one quality in its relation to one (physical) object and at the same time another quality in its relation to a second object. Against this it seems to Professor Lovejoy a good empirical objection that "the only instances of relativity of pure qualities which we actually discover in experience are instances of relativity to minds or sentient organisms, not of relativity to other physical objects" (p. 428). This seems a most astounding statement, for not only does it beg the question about qualities being relative to mind, but it flatly ignores the fact that the neo-realists have been at pains to compile a long list of such instances of physical or objective relativity so that even those who share the neo-realist faith as little as Professor Dewey have admitted this point. I can explain Professor Lovejoy's lapse only by the fact that in his keenness to consider the dialectic difficulties of the neo-realism he has overlooked the empirical evidence for it.

V

As both Professors Montague and Lovejoy think that the point of view of my note on secondary qualities seriously affects neo-realism, a few remarks on this point may be expected here.

Between a complete subjectivism and a complete objectivism, I can see no theoretic difference. The distinction between different kinds of entities can remain the same in the two systems. It seems to me of no import to argue against subjectivism as solipsism, since the subjectivist can readily distinguish in consciousness between his own private body or personal thoughts and the bodies and thoughts of others. Likewise pan-objectivism need not, and in the neo-realist form certainly does not, deny the difference between the different levels of existence of bodies, thoughts, etc. Wherein these differences consist is for every thoroughgoing philosophy a matter of more or less empirical study of the diverse facts involved. But while there is

no important theoretic difference between pan-objectivism and pan-subjectivism, there is a practical one based on the psychologic fact that the set of symbols or words we choose drags with it a system of subconscious associated meanings which determine the direction of inquiry. I prefer to begin with the method of pan-objectivism, and try to see how far it can carry me, but this mainly as a counsel of prudence to any one who, as unfortunate as myself, walks in darkness whenever he asks what specific difference consciousness as an observer makes to the things which constitute the physical universe. But while I speak with genuine certainty and unfeigned misgivings of all questions relating to the nature of consciousness, I feel certain that neither Professor Lovejoy nor any one else has as yet made out a convincing case for the view that consciousness is the manufacturer of secondary qualities, mere appearances, illusions, or other entities outside of the charmed circles of the real things in themselves. I have read all of Professor Lovejoy's polemics against neo-realism with the care that his writings always deserve, but I fail to see that he has ever met the point made by the neo-realists to the effect that the difference between the different levels of existence, such as between appearance and reality, does not coincide with the difference between the mental and the non-mental. Professor Lovejoy wofully misapprehends Holt's position when he implies that the latter believes "that irresoluble and unqualified contradictions exist in the objective world" (p. 423). The realm of existence, according to Holt, is precisely the realm of entities having non-contradictory relations. But contradictions *subsist*, and this subsistence is no more mental than the field of existence. Perhaps the neo-realists may save themselves from this common misunderstanding if they will develop a complete theory of categories or types of existence to take the place of the rather inadequate distinction between existence and subsistence.

Professor Lovejoy, with the sympathy of Professor Montague, assumes that realism must necessarily regard the category of things, and even of things in themselves, as fundamental. I think that the neo-realists, so far as they are inclined to recognize the reality of relations or universals, are taking a more hopeful path. The contrast between a realism of things and a realism of relations or universals like Plato's (which seems to me the essence of the historical form of idealism), has been obscured by Kant's unfortunate confusion of the thing-in-itself with the noumenon or object of reason. Neo-realism is helping us get rid of this confusion. It has shown that the difference which separates a realism of things from a realism of relations is for Professors Lovejoy and Montague one of "the weightier matters of the law," and more fundamental than the

difference between the realism and idealism which Montague and Lovejoy typify.

To a realism of brute things the progress of philosophic reflection involved in the sciences seems to me distinctly hostile. The pre-scientific man lives almost exclusively in a world of impenetrable things. The instruments of analysis which science brings reveal to us something of the relational texture of things, and in the clarified vision things lose their grossness. Hard matter, for instance, loses its isolated self-sufficiency. and becomes a vortex or strain in the universal ether, or a group of electric charges (electrons). To naïve common sense which has not penetrated into things and whose vision is not so refined, these conclusions or suggestions of science must remain disconcerting; and when the things analyzed or dissected are still regarded as "sacred" or taboo, the scientific attitude is also regarded as impious. The realism of hard brute things. therefore, seems to me an outcropping of the pre-scientific Adam within us. Hence, when Professor Montague charges that I am a serpent who would drive the neo-realistic Adam out of his Garden of Eden, I gladly (except for the implied reference to my subtlety) accept the analogy. but contend that the serpent was the best friend that Adam ever had, and one that told the truth. By tasting of the tree of knowledge Adam became not only practically productive and creative, but acquired the other, and I believe higher, attribute of divinity, theoretical knowledge, knowing, like the gods, the *difference* between good and evil.

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PROFESSOR THORNDIKE'S ATTACK ON THE IDEO-MOTOR THEORY

IN a paper printed in *The Psychological Review*,[1] Professor E. L. Thorndike presents a searching criticism of the currently accepted theory of ideo-motor action. That theory is itself so important and my colleague's attack upon it is so impressive, and yet to my mind so unconvincing, that, though a layman in psychology, I venture to offer the following objections to his argument.

Throughout his article Thorndike implies that for the idea of an act to produce the act itself, as stated in the ideo-motor theory, would involve a mysterious influence of *sheer similarity* or *similarity as such*, like that assumed in the practise of sympathetic magic.

[1] March, 1913.

And it is on this alleged analogy between sympathetic magic and the ideo-motor theory that he relies to discredit the latter. He supports his general argument by empirical evidence in the form of answers to a questionary. which was designed to show, and which appears to have succeeded in showing, that the theory underlying sympathetic magic and the theory underlying ideo-motor action are regarded by psychologists as differing only in their degree of probability.

I

The extravagance of the results of the questionary, as Thorndike interprets them, should have warned him that something was wrong. For they would appear to indicate that at least two members of the American Psychological Association have a sneaking sympathy for the belief of primitive peoples, that by reason of a magical affinity of similars for one another you can the better injure your enemy by first injuring a wax image of him. My criticism of this sensational conclusion is to urge an interpretation of the answers to the questionary that is more prosaic and, I think, more plausible than the one accepted by Thorndike.

1. I believe that those psychologists (of whom, if memory serves, the present writer was one) who answered the question as to whether or not the wax image procedure could possess any efficacy had in mind nothing magical or crazy, but only the belief that *rehearsing* an act in advance, with wax images or any other accessories and properties, might conceivably make one more skillful and more determined in performing it.

2. My second criticism of Thorndike's interpretation of the replies to his questionary bears less directly upon the immediate point at issue than upon the general procedure to be adopted in the wording of such questions as were submitted. Thorndike argues that the fact that the explicit and detailed formulations of the ideo-motor theory were ranked lower in the order of probable truth than the vaguer and simpler formulations indicates that the more clearly the law was understood the less it was believed. I think that this is a mistaken conclusion, for the following reasons: If I ask you to arrange in the order of their probable truth the propositions—(1) A is B; (2) A is B and C; (3) A is B and C and D, you will put (1) as most probable, (2) as next most probable, and (3) as least probable. And you will make this arrangement on purely formal and *a priori* grounds, regardless both of the meanings assigned to the symbols and of the separate intrinsic probabilities of B, C, and D. For, other things equal, the more complex an event the less its antecedent probability; and the more complex the elements asserted in a proposition the greater the possibility of error and the less the probability

of truth. There is, then, nothing in any way significant or surprising in the fact that the vaguer and more general formulations of the law of ideo-motor action were assigned a higher probability than those that were more detailed and explicit. The extent to which that assignment was made is not a measure of the esteem in which the law is held by the members of the American Psychological Association. It gives no information on that topic at all. In so far as it is a measure of anything it is a measure only of the general intelligence of those who answered the questions. *From all of which it follows that it should be regarded as an axiom of procedure in drawing up questionaries of this type that the various propositions submitted for serial arrangement have the same degree of logical complexity.*

II

Let us now turn from the empirical evidence of the questionary to the general arguments made by Thorndike against the theory of ideo-motor action.

1. The author's main assumption that ideo-motor action implies a mystical influence of sheer similarity analogous to that which is supposed to operate in primitive magic appears wholly unwarranted. For when the idea of an act produces the act, we have but a special case of a type of process which is general throughout nature. All effects are in some degree similar to their causes. And in many cases both in the inorganic and the organic realms the effect repeats the qualities of the cause with great precision. Echoes, reflections, and, above all, the fact of reproduction in every form of living matter, are examples in point. In none of these cases is there any mysterious action of a disembodied principle of similarity. The cause A by transmitting energy through a medium M produces an effect A'. What the qualities constituting the effect A' will be, depends upon the antecedent qualities of the cause A and also upon the medium M. In brief, $A'=f(A, M)$. If M were perfectly transparent, or if its distortions corrected one another, A' would be exactly similar to A. And conversely, the extent to which in a given case the effect fails to duplicate the qualities of its cause depends upon the distorting influence of the medium. Now between a given act and the psycho-cerebral state which we designate the "idea of" that act there is a resemblance. The neural mechanism connecting the two events furnishes a perfectly good medium by means of which the psycho-cerebral cause can produce its physical effect. Experience seems to show that ideal anticipations of simple bodily movements are as a matter of fact followed by the movements themselves. What is there that is mystical or magical in the situation? As we have already said, the world offers innumerable cases in which effects duplicate

the qualities of their causes. Optical images and photographs; auditory images or echoes, and phonographic records; electrical induction and conduction; and the universal tendency of living cells to reproduce their kind—are each and all illustrations of the reproduction of similars. It would be strange indeed if psycho-cerebral states were the only natural events which were incapable of transmitting any of their qualities or relational patterns to their effects. I do not deny that there is a fundamental puzzle as to the manner in which a conscious state is correlated with its cerebral accompaniment. But granted the fact of correlation there is no *further* puzzle as to why or how the two-sided psycho-physical cause produces by the medium of the motor nerves an effect which resembles it.

2. The relation between the ideo-motor theory and the underlying theory of imitative magic is, as Thorndike says, most instructive, but it is instructive in a sense quite other than that which he supposes. The savage perceives, as we do, that effects resemble their causes in many instances, and particularly in the instance of his own acts and the antecedent ideas of those acts. What he does not perceive is that a *medium of transmission* is always necessary for a cause at one place to reproduce its qualities in the form of an effect at another place. He knows nothing of the air as a medium necessary for the production of echoes or of the ether as a medium for the production of images. And in particular he is innocent of what to us is a commonplace of physiology, viz., the necessity of nerve fibers as the medium necessary for the execution of one's plans or ideas. Given his ignorance of the existence of media of transmission and his resulting belief that all action involves action at a distance, it is not only natural, but well-nigh inevitable, that he should infer that a man can influence his neighbor's body with almost the same ease and by somewhat the same methods as serve to influence his own. Things and thoughts thus seem to him to reproduce their like regardless of spatial distances and material obstacles. His reasoning is the same as that of the superstitious person of to-day who concludes that telepathy is as natural as wireless telegraphy, and who fails to perceive that the specific medium of ether which makes possible the latter is wanting (or unavailable) in the case of the former. Thorndike, as we have said, claims that this reasoning of the savage in support of his sympathetic magic is analogous to the reasoning by which the ideo-motor theory is defended. But I think that, on the contrary, it can easily be shown that the reasoning of the savage is analogous not to that used in defending the ideo-motor theory itself, but rather to Thorndike's own reasoning in refuting it. For the savage appears to argue thus:

If my thought of an action tends to produce that action in my own body it will tend equally to produce its like in all other bodies. [*As the ideo-motor theory is observed to be true, sympathetic magic may be inferred to be true.*]

While Thorndike appears to argue thus:

If my thought of an action does not tend to produce that action in other bodies it will equally not tend to produce its like in my own body. [*As sympathetic magic is observed to be false the ideo-motor theory may be inferred to be false.*]

The two arguments when thus condensed into hypothetical propositions are instantly seen to be logically equivalent, the one being the contrapositive of the other. It seems to me, therefore, that my distinguished colleague has fallen rather neatly into the very trap which he set for his enemies. In charging the upholders of the ideo-motor theory with the fallacy of sympathetic magic he has himself committed that fallacy. For, as we have seen, the fallacy underlying sympathetic magic is the assumption that because an idea can produce its like when a physical medium is present, it can do the same when such a medium is absent. Thorndike's fallacy seems to consist in the obverse assumption that because it would be miraculous for an idea to produce its like in the absence of a medium it would be equally miraculous for a reproduction to take place when a medium, such as the nervous system, was present. In each case the crucial difference due to the presence or absence of a medium is overlooked.

III

In the first section of our paper we criticized the interpretation which Professor Thorndike put upon the answers to his questionary; and the inductive reasoning by which he sought to establish a damning analogy between sympathetic magic and the ideo-motor theory; in the second section, we endeavored to answer his attempt to demonstrate by deductive analysis the existence of that same analogy; in this third and last section we have to urge a *reductio ad absurdum* to which our author's conclusion would appear to be open, quite apart from the question as to the soundness of his methods of proof.

The denial of ideo-motor action implies a denial of the possibility of imitation and finally of perception itself.

1. The experience of spontaneous and relatively automatic imitation is very familiar. One person smiles and his companions smile back. A cough or a yawn has the same contagious quality. Gestures, accents, and rhythms appear to be imitated spontaneously. Some of these seeming imitations may have originated as accidental variations and have been preserved for their utility by natural selection.

Such might be the explanation of the tendency of a herd of cattle to bellow together or to run away together, when one member of the herd does either of these things. But it would be rather difficult to establish a survival value for contagious yawning and coughing.

The cases of what we may call voluntary imitation are even more difficult to explain without admitting a tendency of perceptions to reproduce their like. The painting of a picture of any objective situation, or the repetition of a sentence seem quite obviously to imply that a perceptual mental state can produce an object representing it. It may be claimed, however, that the responses to separate stimuli which have been either inherited or learned by the trial and error method and become habits would account for these apparent cases of imitation. But such a reply would overlook the essential feature of the situation. For, granted that the elementary responses have individually been learned, it is the collective structure, the *tout ensemble,* or relational order of combination that is important. And this latter feature is often absolutely novel. The only possible cause of the production of the relations in a picture of a scene that is painted for the first time is the relational pattern revealed in the artist's perception of the object to be painted. It does not detract from the essentially creative function of imagination to point out that the sensory material is furnished by memory and that imagination only originates the relational pattern, for it is precisely the latter that is important and distinctive. No more does it explain the imitative reproduction of a complex relational scheme to point out that we have acquired the habit of reproducing the straight lines or the simple tones which may constitute the material elements of the scheme. In short, unless perceptual ideas could reproduce their like, in accordance with the principle asserted in the ideo-motor theory, imitation, both automatic and voluntary, would be impossible.

2. Professor Thorndike does not deny that a group of objects and events outside the organism can and does produce that state of affairs which we call the perception of those objects. And however we may answer the question as to whether or not the "secondary" or non-quantitative qualities of objects exist apart from their relation to the sense-organs, no one denies that ideas or perceptions have a relational similarity or one-to-one correspondence with their causes. *Now any consideration that would make it impossible for a system of ideas to be the cause of a corresponding system of objective acts would make it equally impossible for a system of objects to be the cause of corresponding ideas by which they were perceived.* For the effecting of a movement by a perception and the effecting of a perception by a movement are but the two directions of one and the same kind of causal process. Hence, to reject the possibility of ideo-motor action

logically compels a rejection not only of imitation, but of perception itself.

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AN EXPERIMENTAL STUDY FOR CLASSES IN REASONING AND ITS TRANSFERENCE

FAIRLY ample provisions for experimental approach to the notions of sensations, perceptions, imagery, and even attention already exist, thanks to the experimental psychologist who, from the nature of his science, made these largely analytic conceptions his first concern. The teachers of the science feel the need for enlarging these earlier "tramping-grounds" so as to include such notions as concepts, judgments, recognition, reasoning, and so on, and to place them on an experimental basis. The need of better methods of approach to the explanation and control of the thought processes is self evident from the fact that they constitute the direct and essential mental activities involved in learning, in industrial processes, in social intercourse, and in industrial organization. In this connection it is encouraging to observe that a more than substantial beginning in experimentation on the thought processes has been in progress for the last decade. These experimental contributions have been supplemented by critiques, summaries, and a few extended treatises, all of which should enrich our teaching programme.

Some years ago Spindler[1] rendered timely service to those members of the psychological fraternity who have to teach the fundamental notions of the science to beginners by giving a description of the general attitude he adopted and the methods employed in teaching the concept to his classes. I had hoped that the pen of Professor Spindler or that of some other would furnish a similar description of methods of procedure in presenting working notions of other higher thought processes to elementary classes. My continued hope or wish in the matter is father to the account here submitted for presenting the notion of reasoning by means of experimentation.

Neither apology nor justification for an extended use of experimentation in teaching the laws of mental life seems any longer in order. Reference is made to the matter simply to emphasize the desirability of allowing the means by which psychology has become a science to be used in turn as a method in teaching it.

[1] Spindler, F. N.: "Some Thoughts on the Concept," this JOURNAL, Vol. V., page 684.

For clearness and brevity in presentation I have adopted the form in common usage for reporting experimental work with comments here and there.

Problem.—To observe the elements of the reasoning consciousness, their modification under practise, and the transference of the latter.

Material.—Two series of questions asking for dates. Series A consists of two sets I., II., of ten questions each. Series B consists of 200 questions divided into 20 sets of 10 each. A stop-watch. If a higher degree of accuracy and control is desired, the experimenter and subject may work in separate rooms communicating by means of a pair of telephones and measure the time in answering the questions with a Hipp chronoscope provided with a mouth reactor.

SERIES A, SET I

1. If Wednesday is January 28, what will be the date of the next Monday?
2. If Monday is May 3, what was the date of the previous Thursday?
3. If Thursday is September 28, what will be the date of the next Wednesday?
4. If Tuesday is October 3, what was the date of the previous Thursday?
5. If Sunday is August 30, what will be the date of the next Thursday?
6. If Saturday is June 3, what was the date of the previous Sunday?
7. If Friday is July 30, what will be the date of the next Wednesday?
8. If Wednesday is February 3, what was the date of the previous Saturday?
9. If Monday is March 26, what will be the date of the next Sunday?
10. If Thursday is April 1, what was the date of the previous Saturday?

Set II. of Series A is similar to set I., save that the names of the days of the week, of the month, and the dates occur in a different order, *e. g.*, the first given date will be odd and the second even, the third odd and the fourth even, and so on.

SERIES B, SET I

1. If Monday is the 13th, what was the date of the previous Tuesday?
2. If Friday is the 10th, what will be the date of the next Wednesday?

3. If Monday is the 19th, what was the date of the previous Friday?
4. If Friday is the 20th, what will be the date of the next Thursday?
5. If Tuesday is the 27th, what was the date of the previous Thursday?
6. If Tuesday is the 18th, what will be the date of the next Saturday?
7. If Saturday is the 19th, what was the date of the previous Sunday?
8. If Monday is the 12th. what will be the date of the next Saturday?
9. If Tuesday is the 21st, what was the date of the previous Sunday?
10. If Saturday is the 24th, what will be the date of the next Friday?

The remaining 19 sets of Series B are to be prepared by the experimenter according to the plan given below.

Observe that both Series A and B have some features in common. First, the date asked for is either a past (—) or a future one (+). These dates alternate throughout both series. Second, the numbers of days between the given date and the required vary uniformly and are repeated in a regular recurring series of three. Such as 4, 3, 5 or 5, 4, 6 and so on. Of course the subject at first is ignorant both of the numbers and of their order, and, owing to the change of the names of the days with each question, the full discovery of the order comes tardily, if at all. In the test series A the required date is always either in the month preceding or in the month following the given date. In the practise series the two dates are within the same month. The given date that requires a + date is an even-numbered date for the first ten questions, while those that require a — date occur on odd numbers, and in the second ten the odd numbers go with the + dates and the even with the — dates. These two sets of conditions alternate with every set of ten questions in the interest of uniformity and control, and to test their possible effects on the time relations.

Procedure.—The test series A, set I., are given to two groups of subjects (C) control and (P) practise, respectively. The more general nature of the questions and the manner of asking them should first be explained, together with an example of each of the + and — dates. The experimenter should maintain uniformity of manner and of voice and adhere strictly to the same phraseology in putting the questions. The stop-watch is started simultaneously with the pronunciation of the *day* whose date is required and stopped when the subject answers with the number of the required date. (In the test series, however, the answer includes both *month* and *date.*) The first set of Series B should be given to the practise group im-

mediately after performing the first set of Series A, and the remaining 19 sets at the rate of one per day until finished. At the end of the 20th set both groups of subjects are given set II. of Series A. Introspections are made after each answer. Those at the beginning of each new series, especially, are characterized by completeness.

Results.—Arranging and tabulating the results (objective) and checking them by the arithmetical methods in common use offer no serious difficulties to the beginner. The time in answering past and future dates is tabulated in separate columns under the respective signs — and +.[2] The following is a typical record of the mean averages of — and + time for answers to 10 sets of Series B.

No. of trial.	1	2	3	4	5	6	7	8	9	10
Mean	+4.60	4.04	3.40	2.52	3.38	2.56	1.86	2.34	2.84	2.52
Averages	—6.00	5.14	4.10	3.64	3.50	3.22	2.34	2.60	3.60	3.30

The initial and final records of the same series and subjects are: +4.8 and +1.5; —8.0 and —3.5 seconds, respectively. The records of the test series taken before and after the practise series for the same subject are: before +9.76 and —10.90 and after +5.12 and —6.76 seconds, giving an average of 42.30 per cent. of transfer.

Among the observable facts of bodily behavior are: (1) tapping with the fingers on the table, chair arm, subject's body, etc.; (2) resting and covering the face with the hands; (3) "screwing up" the facial muscles, especially about the eyes; (4) closing the eyes and grasping the arm or the seat of the chair; (5) repeating portions of the question half audibly, *e. g.*, the given date. The subjects report a stiffening of the body as the question is put, and a slight, but decided movement of the whole body to the front or back, right or left, according as the answer is given as a — or + date. The writer experiences an incipient movement to the right of the whole body in thinking of a future date and to the left of past dates. One of my subjects refers a future date to the left. I have noticed occasionally a slight toss of both head and hand of this subject to the left when giving a future date and to the right when the given date was past. Both observation and introspection make it possible to trace the history of these extraneous movements as affected by the practise in answering the questions.

Two graphs are drawn, one showing progress in making answers to questions of — dates and the second to questions of + dates.

The introspections are studied and the more significant portions are ranged in a time order for comparison with graphs and tables. The introspections furnish ample opportunity for the study of

[2] I hope to make a full report later of experimental results now being secured from trained psychologists and scientists acting as subjects.

"time forms" as it may appear in imagining the days of the week. One subject finds a "hump" or hillock at Sunday-Monday which he reports as interfering when these two days appear within the time interval.

My subjects so far develop their methods gradually rather than suddenly "in a happy moment." One method finally settled upon is to determine the intervening number of days by always counting forward; in the case of a + date, the count is forward from the given date to the required date, the number thus determined is added; in the case of — dates, the count is forward from the required date to the given one, the number of the count is then subtracted from the given date. Another method developed more slowly, but used eventually with equal rapidity consists in counting forward from the *required* date to the day ending the week of the given date in the case of + dates; the number of the count is deducted from 7 and the remainder added to the given date, *e. g.*, If Tuesday is the 19th, what is the next Saturday? The subject counts: Sunday, Monday, Tuesday, and thinks 3. Then $7-3=4$, but $4+19=23$. Therefore, Saturday is the 23d. For determining a — date the count is forward from the *given* date to the day ending the week from the required date, the number of the count is deducted from 7 and the remainder subtracted from the given date. In determining either — or + dates this subject used the day ending the heptad as the first objective point, and began the count either from the required or the given date, depending on the conditions of the question. After settling upon a method, the subjects soon begin to determine dates of the 6-day interval with marked rapidity; with such an interval the date often seemed *given* with the question and the intervening steps are omitted. Just as the old habit of recognizing dates of 7 days or a week interval formed an objective point from which the date of a 6-day interval is readily determined, so the new habit of apprehending dates of a 6-day interval gradually favored in turn the determination of a 5-day interval. Thus dates of 5- and 6-day intervals are determined with far greater rapidity than those of 4 days!

Discussion and Summary.—(The following questions are merely suggestive and justified in part by the brief results given above; they direct attention to significant portions of the results, encourage further experimentation, and urge a more critical reading of the literature[3] on the part of the student.)

If it be granted that the aspects of reasoning involve (*a*) appre-

[3] Pillsbury, W. B., "The Psychology of Reasoning," 1910; Titchener, E. B., "Experimental Psychology of the Thought Processes," 1909, or Binet, Alfred, "The Psychology of Reasoning," 1907.

hending a problem, (*b*) devising a method, (*c*) applying the method to the problem, and (*d*) an attitude toward the solution as belief, doubt, testing, may the answers to both the test and practise series be accepted as the results of reasoning? The introspections, especially the earlier ones, are studied for purposes of identifying any one or all of these aspects, to ascertain which are more evident and constant, and to identify those that grow less noticeable with practise. What old habits, bodily and mental, were serviceable in devising your method and in applying it? Make a list of the mental and bodily habits formed during the practise series and indicate which ones facilitated or inhibited making answers to the questions in set II., Series A. Was the method that you used gradually developed or did you hit upon it at once? Indicate the kind of questions that were most difficult in Series B; compare these questions with their time records and describe the difficulty in detail. Indicate the dominant type of imagery and the more persistent forms of movement. Is there any appreciable and constant difference in the time required to determine a past date when the given date is an odd number from that when the latter date is an even number? Compare the time required to determine a future date, when the given date is even, with that required to determine a past date, when the given date is odd. (My results thus far do not show a constant difference for all subjects.) Do these several considerations and the recorded results indicate that reasoning processes are subject to modification with practise? State the nature and the direction of the modifications.

Further experimentation is quite possible with these "time reckoning problems" under slight variations in the form of the question and in the time interval, uniformity of control being still maintained. For example, if Wednesday is the 16th, what *day* of the week is the 19th? Or, if Wednesday is the 16th, what day of the week was the 11th? Or again, upon what date *will* an 8 months' note mature that was made March 15th? Or, upon what date *was* an 8 months' note made that matured November 15th? These conditions produce four types of problems: When the time interval is limited to weeks the problems are (1) a date and an interval given, to find a date; (2) given a day and two dates, to find the other day. When the time interval is limited to months the problems are (3) a date and an interval given, to find a month and date; (4) given two dates and a month, to find the other month.

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REVIEWS AND ABSTRACTS OF LITERATURE

Religion and Free Will: A Contribution to the Philosophy of Values. W. BENETT. Oxford: The Clarendon Press. 1913. Pp. 345.

The sub-title might well have been left off this volume. The book will hardly reward the reader who searches it for new light on the problem of values; and the pages are given over to a rather loose-jointed discussion of religion and of free will.

The only place where the topic of values is in the forefront is in the latter half of Chapter I.; and here, not only is the argument reminiscent of other theories (*e. g.*, Münsterberg's), but it is practically duplicated in other terms in Chapter II. This argument runs: Nothing in life is more certain than the existence of values. Yet values point conclusively to a final end; there can be no values without it. What then is the end? A survey of evolution fails to reveal any end which we can have any reason for preferring to present conditions of life on earth. In fact, the process is endless. We must, then, assume the final end to be external to the process of evolution and beyond the limits of our reason. Here the task must be given over to religion, which alone can furnish man with a supreme final end—an end transcendental, extra-phenomenal. One should pause to ask, what warrant is there for passing from the value experiences of the phenomenal world to a unitary all-inclusive value or final end? If a fundamental unity there be in all the interests and worths of experience, empirical investigation has yet a great discovery and surprise in store. Our author does well to insist that this is an hypothetical assumption.

What is religion? Psychologically it is based on the emotion of worship directed toward a personal God necessarily assumed. Its core of fervent emotion, of unreasoning enthusiasm, of intuitive illuminations, makes it antithetical to science and (so our author thinks) to philosophy. Thus emotionality is fundamental in religion. But it must be supplemented by the intellectual element of dogma. One of the best points in the book is the treatment of dogma (Chapter IV.). If the emotion of worship demands a personal God, the first stirrings of thought cry out for some definition thereof. The intellectual element becomes the organizing factor of the faith, and the development of the religion from primitive devil-worship is due to it. Dogma is thus supplementary to the spirit of the religion, but it is more. It intensifies all the emotional attitudes impartially: if it adds to the ardor of self-sacrifice it also increases the fury of cruelty. But if dogma is to be the efficient organizing and developing power it must beware lapsing into a bare rationality or changing into an illiberal and unspontaneous orthodoxy. An ultimate question is raised: does good prevail; is life worth living? Being limited to single phases or particular classes of human conduct, ethics can give no answer to this supreme question and leaves it to religion. A brief survey of the principal religions of the world shows Christianity to excel all others in speaking for a qualified optimism in the world of experience based on a transcendental end in another world which gives it its real meaning and value. And the past and

future success of Christianity is always dependent on this superimposition of new supernatural values on the old natural values—a transvaluation of values. This, it would seem, is getting at the heart of the author's own position and the message of the volume. Asceticism in most respects shows this point of view clearly by exaggerating it; but it is a little hard to see why the whole of Chapter VI. should be devoted to a rather full discussion of those practises.

This conception of Christianity was indeed vital for many centuries, yet it is plainly to be questioned whether in its more live and promising phases to-day it is a Christianity of this un-sociological, un-scientific type. This lack of sympathy with the modern empirical, sociological tendency is shown in several places where we are informed most impressively that the supreme end of all religion is perfection of individual character, without regard to racial destinies.

The second part of the book is a discussion of the problem of free will and determinism. It opens (Chapter VII.) with the statement that one's answer to this problem is dependent largely on his conception of the final end of human conduct and the method of thinking therein implied. If he looks to the phenomenal world for the ultimate end of human endeavor, he will limit himself to the intellectualistic, scientific, mathematical method, and his answer to the question will be determinism. But what phenomenal end is self-sufficient and complete? Pleasure is most generally named, but when taken as an end it defeats itself. The religious attitude, on the contrary, which looks beyond experience for its ultimate goal, and which uses the "teleological method" (recognizing a spontaneity in life which is inexplicable to science), makes room for freedom. Freedom of the will, we are told (Chapter VIII.), is a freedom traceable to a transcendental, non-empirical self, behind all phenomena (almost a Kantian will over again). This is the real key to individual personality.

According to the author (Chapter IX.) the doctrine of determinism is coming to play havoc with the administration of justice. Justice, to him, is the vengeful emotion held within bounds that maintain equality of retribution with offense, and implies a recognition of freedom. The concept of determinism is substituting scientific and prudential methods for red-blooded indignation, and the nursing (reformation) of criminals is both illogical and socially suicidal! It is hard to feel convinced of the seriousness of some of these pages.

An interesting "Note on the Misuse of Terms" indicates that many terms originally implying purpose and value have been wrongly appropriated by science, which uses them without such implications. Cause, *e. g.*, really refers to the spontaneous initiation of a series, not to a link in a series; instance the German *"Ursache."*

The relation of scientific method to human purposes is stated well in several places. "With science, emotion precedes activity and sets it to work, but it does not direct it course" (p. 231). "Science . . . supplies no ends. The ends must be already there" (p. 263). "Ultimately, science itself is a branch . . . of ethics; but it proceeds . . . by a special and independent method" (p. 341). In spite of this, the author is almost

frankly anti-intellectualistic, even anti-empirical and anti-sociological, as has been pointed out in places. In one place (p. 100) he refers to the "degeneration of character, which is the ultimate consequence of an exclusive devotion to science." If this be not either ignorance or disregard of numerous biographies, it is explicable on the basis of the author's conception of high character as an "ardour of unreasoning enthusiasm" (p. 116) by which "a devil-worshiper will be stronger than a man who is his superior in morality, but an atheist" (p. 107).

On almost every page occur variants of the expression, "processes of evolution." They appear to be dangerously near cant, for nowhere is evolution, as we generally understand it to-day, given fair description or fair handling. A continual strife of opposites in something of an Heraclitean sense seems nearer the author's meaning; and these opposites when given the names "good" and "bad" hardly need more than capitalization to take on an Ormuzd-Ahriman character.

Taken as a whole, the book seems strangely out of touch with thinking of the twentieth century. The style of the author is not commendable: a loose, almost irresponsible theorizing with highly abstract terms, and a method of argument that assumes either great sympathy or great credulity on the part of the reader. As to composition, printing, and binding, suffice it to say that the book is issued by the Clarendon Press.

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Das Unendliche und die Zahl. HUGO BERGMAN. Halle: Verlag von Max Niemayer. 1913. Pp. 88.

In this study of infinity the author is not concerned with the question whether infinity exists as a physical reality, but only whether it exists as a mathematical concept. Is such a concept thinkable? Is it consistent with the other notions of mathematics? His answer is that there is such a thing as an infinite magnitude, or an infinite class, but no such thing as an infinite number.

Bergman uses *number* in the definite and narrow sense of positive integer. A number is a "counter"; it answers the question "how many?" There have been two errors made with regard to the infinity-concept,—the earlier error of regarding infinity as a fixed number that is very large, and the later error of confusing infinite number with infinite class. An infinite class is a class that may be put into one-to-one correspondence with a part of itself as, for example, the class of positive integers may be matched one-to-one with the class of perfect squares

1, 2, 3, 4, 5, . . .
1, 4, 9, 16, 25. . . .

Such a class, however, never answers the question "How many?", for it is evidently insufficient to say that the number of things in a class is known by putting this class into one-one correspondence with another class where the number of things is unknown. Thus we can not know the number of perfect squares through the correspondence which we have just established.

There is no such thing as an infinite number because the counting process limits itself at each step. 2 exists only as $1+1$, 3 exists only as $2+1$, *et cetera*. Each number comes into being only through "following" some other number. It is similarly true of classes, as Cantor has shown, that if a given class is finite, then the class formed by adding one more member is also finite. And if an infinite number could be formed by the counting process, what would it mean and how would it differ from the finite numbers?

In saying that there is no such thing as an infinite number, Bergman does not call in question the results of Cantor and his school regarding infinite classes, but protests only against the meaning given to these results. His treatment is somewhat long for his thesis, but is interesting historically on account of numerous quotations, in particular from the works of Galileo and Leibnitz.

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Bergson for Beginners. DARCY B. KITCHIN. New York: The Macmillan Company. 1913. Pp. vii + 255.

The attempt to expound Bergson's philosophy by following his works chronologically is difficult because of the absence of systematic framework, or constructive plan, which is an avowed character of this philosopher's writing. Mr. Kitchin has made a skilful and reasonably successful attempt, however, to accomplish this task. While he recognizes that "Time and Free Will" "gives an exposition of the ideas which underlie the whole of Bergson's philosophy," he objects to Mr. Carr's opinion that Bergson's thought has not developed essentially in the later works. The contrary conviction is not very successfully justified, in the reviewer's opinion; but no doubt it accounts for this author's willingness to find the chronological order the effective one for his exposition.

This plan of the work, taken together with the wording of the title, may give rise to illusory expectations in the uninstructed. A summary of the book would indeed be a condensed statement of all Bergson's work, since the book itself is admirably inclusive. But it is itself mainly a summary, and recalls rather that misguided type of abridgment which able students sometimes prepare, at college, for those incompetents who "cram" for their examinations, than a very enlightening interpretation. The college pre-examination "syllabus" or "digest" is sometimes an admirable achievement of thinking on the part of its author, but the purpose and result of it are unsound; it only makes for the atrophy of the thinking faculty in those whose first care is to side-step thinking of their own. I am not saying that this book is mere abridgment: there are a thoughtful Introduction and Conclusion. But these are a small proportion of the book, and the rest, I believe, would be more valuable—to beginners no less than others—if the attempt at methodical inclusiveness had yielded somewhat to a more critical interpretation. To some of Bergson's more important critics the author pays his respects, very briefly, but the questions at issue are not very satisfactorily examined.

There is a list of Bergson's works, and a very short list of works about them.

Two obvious proof-reading errors are the omission of the word "not" at the end of the first line (p. 198), and the substitution of the word "institution" for "intuition," in the ninth line from the bottom (p. 248).

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JOURNALS AND NEW BOOKS.

REVUE PHILOSOPHIQUE. June, 1914. *L'Activité Chemique du Cerveau* (pp. 557–580): E. BOHN. – A summary of results up to date, concluding with the statement that "the human brain has become enormous not because it has been greatly exercized, but because human blood proved to be an excellent *milieu* for its growth." *Les Conditions Générales de la Connaissance* (pp. 581–610): FR. PAULHAN. – Knowledge appears as "an assimilation of subject to object, and also at the same time, of object to subject—an assimilation which permits of exact knowledge, the further the assimilation is pushed, the more exact being the knowledge." The identity of subject and object is the limit to which knowledge tends. *La Vérité Spéculative* (pp. 611–623): EMILE BRÉHIER. – The notion of a speculative truth, according to which reality is like an object that one contemplates, is a contradictory notion, because of the inclusion in the concept of "truth of the conceptual order" and "truth of the intuitive order." *Analyses et Comptes Rendus.* René Berthelot, *Un Romantisme Utilitaire:* LIONEL DAURIAC. J. Maritain, *La Philosophie Bergsonienne:* LIONEL DAURIAC. *Revue Générale.* Serge Boulgakov, *Filossofía Khoziaïstva: Tchast Pervaïa, Mirkak Khoziaïstvo* (*La Philosophie de l'Organization Économique*): G. SELIBER. A. Bogdanov, *Filossofiia Jivovo Opyta* (*La Philosophie de l'Expérience Vivante*): G. SELIBER. Serge Boulgakov, *Dva Graga* (*Les Deux Cités. Récherches sur la Nature des Ideés Social*): G. SELIBER. *Filossofsky Sbornik L. M. Lopatinou* (*Récueil Philosophique en l'Honneur de L. Lopatine*): G. SELIBER. Lopatine L., *Filossofskiia Kharakteristikii Retchi* (*Caractéristiques et Discours Philosophiques*): G. SELIBER. S. Askoldov, *A. A. Kozlov* (*Série: Penseurs Prusses*): G. SELIBER. *Notices Bibliographiques. Revue des Périodiques.*

Varendonck, J. Recherches sur les Sociétés d'Enfants. Travaux de l'Institut de Sociologie Solvay. Notes et Mémoires, No. 12. Brussels: Misch and Thron. 1914. Pp. 93. 6 Fr.

Watson, John B. Behavior: An Introduction to Comparative Psychology. New York: Henry Holt and Company. 1914. Pp. xii + 439.

NOTES AND NEWS

Report of Professor Sharp's Chicago Conference Paper

To the Editors of the Journal of Philosophy, Psychology, and Scientific Methods:

Professor F. C. Sharp requests that the following abstract be printed as a substitute for my report of his paper before the Chicago Conference on Legal and Social Philosophy, April 10, 1914. I hope you can give the necessary space to the matter.

Very truly yours,
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The Moral Criterion in Some Recent Decisions of the United States Supreme Court.—That the law is utilitarian and ought always to be interpreted and developed with this truth in mind is recognized by practically every present-day student of the subject. But this view of the matter is too vague to be of very much practical value. The pressing problem is how to proceed when interests conflict, and it is here that the most important differences of opinion among our judges arise. In matters which concern the claims of individual liberty, the privileges of property, and the demand for equality of treatment, a definite answer has been gradually worked out by the Supreme Court of the United States and has been, for the most part, consistently employed in its decisions. It is most succinctly formulated in Bacon *vs.* Walker (1907), in the declaration: "The power of the state . . . extends to so dealing with the conditions which exist in the state as to bring out of them the greatest welfare of the people." The Principle: Infringement upon the claims of individual liberty, property, or equality, is justified when necessary for the attainment of a greater good, has been applied in a great variety of decisions so that its meaning is unmistakable. That this principle is morally a just one would be agreed by the overwhelming majority of the ethicists of our generation. This fact is significant. For in interpreting the vaguely worded guarantees of the Fifth and Fourteenth Amendments of the Federal Constitution the Court has been compelled to build up the law through a process of judicial legislation. And judicial legislation, like all other forms, is under obligations to be guided by principles of justice. Most of the state courts have had to start from constitutional provisions essentially the same in content as the amendments in question, and to make use in a similar manner of the process of judicial legislation. If then the authority of the Federal Supreme Court and the consensus of ethicists are worth anything, it would seem that they ought to bring their decisions more closely into conformity with the decisions of this Court.

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The Fifth International Congress of Philosophy, which was to have been held in London from August 31 to September 7, 1915, has, on account of the war, been indefinitely postponed.